

REMARKS

Claims 1-13 and 21-27 are the claims pending in the application. Applicants have added new claims 21-27 to more particularly define the invention. Applicants confirm the restriction and election of species requirement, and thus have cancelled claims 14-20 without prejudice or disclaimer. Claims 1-13 are rejected on prior art grounds. Applicants respectfully traverse the prior art rejections based on the following discussion.

I. The Prior Art Rejections

Claims 1-3, 5, 7 and 8, are rejected under 35 U.S.C. 102(e) as anticipated by Desilets, et al. ("Desilets")(U.S. 2004/0040637 A1). Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Desilets in view of Becuwe ("Becuwe") (U.S. 5,034,072). Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Desilets. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Desilets in view of Nix, et al. ("Nix") (U.S. 3,389,025). Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Desilets in view of Levinthal ("Levinthal") (U.S. 4,086,110).

A. The Rejection Based on Desilets

Regarding claims 1-3, 5, 7 and 8, Desilets fails to disclose, teach or suggest the features of independent claim 1, and related dependent claims 2, 3, 5, 7 and 8, including at least one nanotubular structure comprising the high energy material. (See Page 3, lines 15-17; Page 6, lines 3-10; and Page 8, lines 1-2).

Indeed, Desilets merely teaches a conventional flash-ignitable energetic material

with an energetic composition including a mixture of an energetic material, carbon nanotubes and activated carbon containing a metal, such as, palladium. This composition is designed to release a photoacoustic effect when subjected to a flash of light. Applicant respectfully submits that the Office Action mischaracterizes the Desilets invention as disclosing an energetic composition including one or more nanotubular structures comprised of the high energy material. Indeed, Desilets clearly teaches that the nanotube is a carbon nanotube not a high energy material nanotube. (See Office Action, Page 2, Last Full Paragraph; and Desilets, Abstract, Column 1, Paragraphs [0002], [0007]-[0009]; and Column 3, Paragraph [0018]).

In contrast, Applicant discloses an energetic composition, including a high energy material and at least one nanotubular structure comprised of the high energy material, that is, the nanotube structure is composed of the high energy material, for example, see new claim 21. The novel and critical feature of this formulation is that "nanotubes made of energetic material increase the burn rate beyond that expected just for the incorporation of particles of the same energetic material." Accordingly, Applicants' invention includes nanotubes composed of high energetic material, that is, high energetic material produced into nanotube shapes, for increased burn rates, whereas the Desilets composition is specifically formulated to include conventional carbon nanotubes to produce a photoacoustic effect. Further, Desilets only teaches and suggests the use of basic carbon nanotubes not nanotubes composed of a high energy material like Applicant's invention. Thus, an attempt to substitute Desilets' carbon nanotubes for Applicant's high energy material nanotubes could not produce the desired burn rate like Applicant's inventive composition. Therefore, Applicant's invention is structurally distinct from the

conventional Desiltes structure. (See Application above; and Page 7, line 15-Page 8, line 2).

Please note, to one of ordinary skill in the art, nanotubes comprised of carbon have significantly lower energy bonds compared to Applicant's nanotubes comprised of high energetic material, such as, RDX. Therefore, Desiltes does not disclose, teach or suggest including at least one nanotubular structure comprising the high energy material. (See above).

Based on the above, the Applicants traverse the assertion that Desiletes discloses or teaches Applicants' invention of independent claim independent claim 1, and related dependent claims 2, 3, 5, 7 and 8.

Regarding claim 6, for at least the reasons outlined above, Applicants submits that Desiletes, alone or in combination, does not disclose, teach or suggest, including at least one nanotubular structure comprising the high energy material as recited in independent claim 1, and related dependent claim 6.

Further, please note, Applicants traverse the assertion that selection of the diameter of the high energetic material nanotubes in view of Desiletes would be obvious to one of ordinary skill in the art. Indeed, Applicants' inventive composition is focused on burn rate, which requires that rocket motors burn at a certain pressure in part due to the diameter of the nanotubes. Since Desiltes is focused on a photoacoustic effect not burn rate like Applicant's invention, nothing in Desiletes discloses, teaches or suggests selection of diameters of nanotubes, for example, as recited in claim 6. (See Office Action, Page 3, Last Paragraph, and Page 4, First Paragraph).

B. The Rejection Based on Desilets in view of Becuwe

Regarding independent claim 1, and related dependent claim 4, first the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

In particular, Becuwe pertains to gun powder and propellant formulations, which lower the flame temperature of the gunpowder and reduce firearm barrel erosion. (See Becuwe at Abstract; Column 1, lines 10-20 and Column 3, lines 31-37).

Nothin within Desilets, which pertains to a flash-ignitable composition designed to release a photoacoustic effect when subjected to a flash of light, suggests propellant formulations for reducing flame temperature and firearm barrel erosion. (See above).

Therefore, one of ordinary skill in the art would not have combined these references absent hindsight.

Second, even assuming that the references would have been combined, Desilets, as indicated above, does not disclose, teach or suggest the features of independent claim 1, and related dependent claim 4, including at least one nanotubular structure comprising the high energy material. (See above).

Indeed, Applicant agrees with the Office Action that Desilets does not disclose, teach or suggest that the energetic composition further includes a melt temperature melting component as recited in claim 4. (See Office Action, Page 3, Paragraph 4).

Becuwe is also deficient and does not make up for the deficiencies of Desilets.

Instead, Becuwe merely recites a gun powder, including a triazole material and a gunpowder forming ingredient, in the form of powder without any nanotubes, let alone, nanotubes composed of a high energetic material. Thus, Becuwe clearly does not teach or

suggest, including at least one nanotubular structure comprising the high energy material. Since Becuwe does not include any nanotubular structure, Becuwe is deficient and thus does not teach the limitations of dependent claim 4. (See Becuwe at Abstract; Column 3, lines 45-60; and Column 5, lines 20-38).

For at least the reasons outlined above, Applicant respectfully submits that neither Desilets nor Becuwe, alone or in combination, disclose, teach or suggest including at least one nanotubular structure comprising the high energy material as recited in independent claim 1 of Applicant's invention.

For the reasons stated above, the claimed invention as defined by independent claim 1, and related dependent claim 4, is fully patentable over the cited references.

C. The Rejection Based on Desilets in view of Nix

Regarding independent claim 1, and related dependent claims 9 and 10, first the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

In particular, Nix pertains to a propellant composition containing high energy metal in the form of multidimensional crosses, which is used as a burning rate modifier for solid propellant grains. (See Nix et al. at Abstract; Column 1, lines 20-25 and Column 2, lines 2-15).

Nothing within Desilets, which pertains to flash-ignitable composition designed to release a photoacoustic effect when subjected to a flash of light, suggests propellant formulations in a multi-dimensional cross shape for being a burning rate modifier. (See above).

Therefore, one of ordinary skill in the art would not have combined these references absent hindsight.

Second, even assuming that the references would have been combined, Desiltes, as indicated above, does not disclose, teach or suggest the features of independent claim 1, and related dependent claims 9 and 10, including at least one nanotubular structure comprising the high energy material. (See above).

Indeed, Applicant agrees with the Office Action that Desilets does not disclose, teach or suggest that one or more nanotubular structures are substantially longitudinally aligned as recited in claim 9, and similarly claim 10. (See Office Action, Page 4, Paragraph 3).

Nix is also deficient and does not make up for the deficiencies of Desilets.

Instead, Nix merely recites a propellant composition, including high energy metal in the form of multidimensional crosses where the metal staples are incorporated throughout the grain without any nanotubes, let alone, nanotubes composed of a high energetic material. Thus, Nix clearly does not teach or suggest, including at least one nanotubular structure comprising the high energy material. Since Nix does not include any nanotubular structure, Nix is deficient and thus does not teach the limitations of dependent claim 4. (See Nix at Abstract; Column 1, lines 20-35; and Column 2, lines 30-Column 3, line 8).

For at least the reasons outlined above, Applicant respectfully submits that neither Desilets nor Nix, alone or in combination, disclose, teach or suggest including at least one nanotubular structure comprising the high energy material as recited in independent claim 1 of Applicant's invention.

For the reasons stated above, the claimed invention as defined by independent claim 1, and related dependent claims 9 and 10, is fully patentable over the cited references.

D. The Rejection Based on Desiletes in view of Levinthal

Regarding independent claim 1, and related dependent claims 11-13, first the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

In particular, Levinthal pertains to an oxidizer-propellant formulation, which is insoluble in water to reduce the need for desiccants and hermetic seals with rocket motors. (See Levinthal at Abstract; Column 1, lines 10-15, lines 32-48 and lines 55-61).

Nothing within Desiletes, which pertains to flash-ignitable composition designed to release a photoacoustic effect when subjected to a flash of light, suggests oxidizer-propellant formulations, which is water insoluble. (See above).

Therefore, one of ordinary skill in the art would not have combined these references absent hindsight.

Second, even assuming that the references would have been combined, Desiletes, as indicated above, does not disclose, teach or suggest the features of independent claim 1, and related dependent claims 11-13, including at least one nanotubular structure comprising the high energy material. (See above).

Indeed, Applicant agrees with the Office Action that Desiletes does not disclose, teach or suggest the composition as a solid propellant as recited in claim 12, and similarly claims 11 and 13. (See Office Action, Page 3, Paragraph 4).

Levinthal is also deficient and does not make up for the deficiencies of Desilets.

Instead, Levinthal merely recites an oxidizer-propellant formulation, including crystals of HMS and ammonium perchlorate without any nanotubes, let alone, nanotubes composed of a high energetic material. Thus, Levinthal clearly does not teach or suggest, including at least one nanotubular structure comprising the high energy material. Since Levinthal does not include any nanotubular structure, Levinthal is deficient and thus does not teach the limitations of dependent claim 4. (See Levinthal at Abstract; and Column 2, line 25-Column 4, line 14).

For at least the reasons outlined above, Applicant respectfully submits that neither Desilets nor Levinthal, alone or in combination, disclose, teach or suggest including at least one nanotubular structure comprising the high energy material as recited in independent claim 1 of Applicant's invention.

For the reasons stated above, the claimed invention as defined by independent claim 1, and related dependent claims 11-13, is fully patentable over the cited references.

III. Formal Matters and Conclusions

In view of the foregoing, Applicants submit that claims 1-13 and 21-27, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayment to Attorney's Deposit
Account Number 50-1114.

Respectfully submitted,

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